INFLUENCE OF VELVETLEAF DENSITY AND SOIL-APPLIED HERBICIDE ON DEVELOPMENT OF SIZE HIERARCHIES. J. Anita Dille, Assistant Professor, Department of Agronomy, Kansas State University, Manhattan, KS 66506.

Sizes of individual plants in a population are generally far from uniform even when they emerge together. This inequality in plant size, or size hierarchy, has implications in the competitiveness, reproductive capacity, and mortality of individual plants, and of the plant population. The objective of this study was to determine the influence of velvetleaf density on development of size hierarchies with and without exposure to a soil-applied herbicide.

A greenhouse experiment was initiated on June 30, 2000 at Manhattan, KS. Black plastic flats (36- by 50- by 10-cm) were filled with clay loam soil. Velvetleaf seed were sown at equidistant spacings to obtain three densities equivalent to 115, 200 and 300 seedlings m^{-2} (21, 36, and 54 seedlings per flat). Five seed were sown at each spacing. Immediately after sowing, flats were either unsprayed or sprayed with a 0.023 kg ha^{-1} application of flumetsulam using a bench-type sprayer equipped with 80015 spray tips, 187 L ha^{-1} spray volume at 3.2 km per h. The experimental design was a randomized complete block with three replications. Individual plant height of the first emerged velvetleaf seedling at each location (others were removed) was measured 7, 14, 18, 21, 25, and 28 days after planting (DAP). The heights of all individuals were tracked throughout the experiment.

At 7 DAP, differences in average height are obvious between sprayed (11.2 mm) and unsprayed (22.7 mm) velvetleaf plants across densities. Flumetsulam did not impact velvetleaf germination and emergence, but does impact height immediately. The frequency distribution of sprayed individuals at 7 DAP was normal with a high mean frequency, while the distribution was also normal for unsprayed individuals, the distribution was wider around the mean frequency. This indicates greater variation in emerged and growing individuals. By 14 DAP, velvetleaf heights for both sprayed (22.6 mm) and unsprayed (46.8 mm) individuals were higher at the higher density compared to the two lower densities. The height differential between sprayed and unsprayed individuals was also increasing over time. At later DAP, the frequency distribution became skewed as expected, with few tall individuals and several short individuals. This size distribution could have an impact on the effectiveness of postemergence herbicide applications due to shading and competition.